Chapter 15. Probability

Question-1

(iv) P (A) = 1/2, P (B) = 1/4, P (C) = 1/8, P (D) = 0.46

Solution:

(i) P(A)+ P(B)+ P(C)+ P(D) = 0.37+ 0.17+ 0.14 + 0.32 = 1.00

Total Probability = 1

∴ Permissible.

(ii) P(A)+ P(B)+ P(C)+ P(D) = 0.30 + 0.28 + 0.26 + 0.18 = 1.02 > 1

∴ not permissible.

(iii) Not possible since P (C) is negative.

(iv) P (A) + P (B) + P (C) + P (D) = $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}$

$= \frac{8+4+2+1}{16} = \frac{15}{16} \neq 1$

Since the total probability ≠ 1. It is not permissible.

Question-2

(iii) a sum of 9 or 11

Solution:

(i) Sample space = {(1,1) (1,2), (1,3), (1,4), (1,5), (1,6), (2,1) (2,2), (2,3), (2,4), (2,5), (2,6), (3,1) (3,2), (3,3), (3,4), (3,5), (3,6), (4,1) (4,2), (4,3), (4,4), (4,5), (4,6), (5,1) (5,2), (5,3), (5,4), (5,5), (5,6), (6,1) (6,2), (6,3), (6,4), (6,5), (6,6)}

n(S) = 36

A = obtaining sum less than 5

= {(1,1) (1,2), (2,1), (3,1), (2,2), (1,3)}

n(A) = 6

∴ P(A) = $\frac{n(A)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

(ii) B = obtaining sum greater than 10 = {(5,6) (6,5) (6,6)}

∴ n(B) = 3

∴ P(B) = $\frac{n(B)}{n(S)} = \frac{3}{36} = \frac{1}{12}$

(iii) C = a sum of 9 or 11

C = {(4,5) (5,4) (3,6) (6,3) (6,5) (5,6)}

∴ n (C) = 6

∴ P(C) = $\frac{n(C)}{n(S)} = \frac{6}{36} = \frac{1}{6}$

Question-3

Three coins are tossed once. First the probability of getting

(i) exactly two heads

(ii) atleast two heads

(iii) almost two heads

Solution:

n (S) = 8

Probability of getting head = $\frac{1}{2}$ and Probability of getting tail = $\frac{1}{2}$

(i) Probability of getting exactly two heads = $3C_2 \left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^2 = \frac{3}{8}$

(ii) Probability of getting atleast two heads

= P(2) + P(3)

= $3C_2 \left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^2 + 3C_3\left(\frac{1}{2}\right)^3$

= $\frac{3}{8}+\frac{1}{8}=\frac{4}{8}=\frac{1}{2}$

(iii) Probability of getting almost two heads = P(0)+ P(1)+ P(2)

$= 3C_0\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^3 + 3C_1\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^2 + \frac{3}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{3}\right)^1$

$= \frac{1}{8}+\frac{3}{8}+\frac{3}{8} = \frac{7}{8}$

Question-4

(iii) the card is either queen or 7?

Solution:

Probability of the card is jack or king

= Probability (jack) + Probability (king)

$= \frac{4}{52} + \frac{4}{52} = \frac{2}{13}$

Probability of getting the card that will be 5 or smaller = $\frac{4+4+4+4}{52} = \frac{16}{52} = \frac{4}{13}$

Probability of getting queen or 7 = $\frac{4+4}{52} = \frac{8}{52} = \frac{2}{13}$

Question-5

A bag contains 5 white and 7 black balls, 3 balls are drawn at random. Find the probability that

(i) all are white

(ii) one white and 2 black.

Solution:

(i) n (S) = $10C_3$

A = event of getting all the three are white balls

∴ n (A) = $5C_3$

\ P(A) = $\frac{5C_3}{10C_3} = \frac{5 \times 4 \times 3}{1 \times 2 \times 3} \times \frac{1 \times 2 \times 3}{10 \times 9 \times 8} = \frac{1}{12}$

(ii) B = event of getting one white and 2 black balls

n (B) = $5C_1 \times 7C_2$

∴ P(B) = $\frac{5C_1 \times 7C_2}{10C_3} = 5 \times \frac{7 \times 6}{1 \times 2} \times \frac{1 \times 2 \times 3}{10 \times 9 \times 8} = \frac{7}{8}$

Question-6

In a box containing 10 bulbs, 2 are defective. What is the probability that among 5 bulbs chosen at random, none is defective.

Solution:

Probability of getting a defective bulb = $\frac{2}{10} = \frac{1}{5}$ ∴ Probability of getting a non defective bulb = $\frac{4}{5}$

While 5 bulbs are chosen at random, the probability of getting none of the defective bulb is = $10C_5\left(\frac{1}{5}\right)^0\left(\frac{4}{5}\right)^5$

$= \frac{10\times 9\times 8\times 7\times 6}{1\times 2\times 3\times 4\times 5}\times\frac{4\times 4\times 4\times 4\times 4}{5\times 5\times 5\times 5\times 5} = 10C_5\left(\frac{4}{5}\right)^5$

Question-7

(i) one is a mango and the other is an apple

(ii) both are of the same variety.

Solution:

$n(S) = 7C_2$

A = getting 1 mango and 1 apple

$n(A) = 4C_1 \times 3C_1 = 4 \times 3$

$\therefore P(A) = \frac{4\times 3}{7\times 6}\times 1\times 2 = \frac{4}{7}$

B = getting both as same variety

$n(B) = 4C_2 + 3C_2 = \frac{4\times 3}{7\times 6}+\frac{3\times 2}{1\times 2} = 6 + 3 = 9$

$\therefore P(B) = \frac{9}{7\times 6}\times 1\times 2 = \frac{3}{7}$

Question-8

Out of 10 outstanding students in a school there are 6 girls and 4 boys. A team of 4 students is selected at random for a quiz program. Find the probability that are atleast 2 girls.

Solution:

Possibilities	Girls 6	Boys 4	Combinations
1	2	2	$6C_2 \times 4C_2 = 90$
2	3	1	$6C_3 \times 4C_1 = 80$
3	4	0	$6C_4 \times 4C_0 = 15$
			Total = 185

$n(S) = 10C_4$

$\therefore$ Probability $= \frac{185}{10C_4} = \frac{185}{10\times 9\times 8\times 7} 1\times 2\times 3\times 4 = \frac{37}{42}$

Question-9

What is the chance that a leap year should have fifty three Sundays?

Solution:

An ordinary year consists of 365 days.

365 days = 52 weeks + 1 day. 52 weeks will have 52 Sundays.

Let one day be any one of the following Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.

The probability that an ordinary year may contain 53 Sundays = $\frac{1}{7}$

A leap year contains 366 days

366 days = 52 weeks + 2 days

These two days may be any one of the following combinations

1) Monday + Tuesday
2) Tuesday + Wednesday
3) Wednesday + Thursday
4) Thursday + Friday
5) Friday + Saturday
6) Saturday + Sunday
7) Sunday + Monday

In the above seven, Sunday appears only on two.

Required Probability $= \frac{\text{No. of favourable events}}{\text{Total no. of events}} = \frac{2}{7} \left(\begin{array}{l}\because n(A) = 2 \\ n(S) = 7\end{array}\right)$

Question-10

An integer is chosen at random from the first fifty positive integers. What is the probability that the integer chosen is a prime or multiple of 4.

Solution:

n (S) = 50

A = {2,3,5,7, 11, 13,17, 19,23,29,31,37,41,43,47,
4,8,12,16,20,24,28,32,36,40,44,48}

n(A) = 27

$\therefore$ P(A) = $\frac{27}{50}$

Question-11

(i) P(B)

(ii) P($\bar{A} \cap \bar{B}$)

Solution:

(i) P(A) = 0.36, P(A ∪ B) = 0.9, P(A ∩ B) = 0.25

P(A ∪ B) = P(A)+ P(B) - P(A ∩ B)

0.9 = 0.36 + P (B) - 0.25

P(B) = 0.9 + 0.25- 0.36= 0.79

(ii) P($\bar{A} \cap \bar{B}$) =1 - P(A ∪ B)= 1-0.9=0.1

Question-12

(i) P($\bar{A}$)

(ii) P(A ∪ B)

(iii) ($A \cap \bar{B}$)

(iv) P($\bar{A} \cap \bar{B}$)

Solution:

(i) P(A) = 0.28, P (B) = 0.44. A and B are mutually exclusive.

P($\bar{A}$) = 1 - P (A) = 1 - 0.28 = 0.72

(ii) P(A ∪ B) = P (A) + P (B) = 0.28 + 0.44 = 0.72

(iii) ($A \cap \bar{B}$) = P (A) - P (A ∩ B) = 0.28 - 0 = 0.28

(iv) P($\bar{A} \cap \bar{B}$) = 1- P(A ∪ B)= 1- 0.72= 0.28

Question-13

Given P(A) = 0.5 , P(B) = 0.6 and P (A ∩ B) = 0.24. Find

(i) P(A ∪ B)

(ii) P($\bar{A} \cap B$)

(iii) P($A \cap \bar{B}$)

(iv) ($\bar{A} \cup \bar{B}$)

(v) P($\bar{A} \cap \bar{B}$)

Solution:

(i) P (A ∪ B) = P (A) + P (B) - P (A ∩ B) = 0.5 + 0.6 - 0.24 = 0.86

(ii) P($\bar{A} \cap B$) = P (B) - P (A ∩ B) = 0.6 - 0.24 = 0.36

(iii) P($A \cap \bar{B}$) = P(A)- P(A ∩ B) = 0.5- 0.24 = 0.26

(iv) P($(\bar{A} \cup \bar{B})$ = 1 - P(A ∩ B) = 1 - 0.24 = 0.76

(v) P($(\bar{A} \cap \bar{B})$ = 1 - P(A ∪ B) = 1 - 0.86 = 0.14

Question-13

Given $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cap B) = 0.24$. Find

(i) $P(A \cup B)$

(ii) $P(\bar{A} \cap B)$

(iii) $P(A \cap \bar{B})$

(iv) $(\bar{A} \cup \bar{B})$

(v) $P(\bar{A} \cap \bar{B})$

Solution:

(i) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.5 + 0.6 - 0.24 = 0.86$

(ii) $P(\bar{A} \cap B) = P(B) - P(A \cap B) = 0.6 - 0.24 = 0.36$

(iii) $P(A \cap \bar{B}) = P(A) - P(A \cap B) = 0.5 - 0.24 = 0.26$

(iv) $P(\bar{A} \cup \bar{B}) = 1 - P(A \cap B) = 1 - 0.24 = 0.76$

(v) $P(\bar{A} \cap \bar{B}) = 1 - P(A \cup B) = 1 - 0.86 = 0.14$

Question-14

A die is thrown twice. Let A be the event. "First die shows 4' and B be the 'second die shows 4'. Find P(A ∪ B).

Solution:

n (S) = 36;

A = event of "first die shows 4"

n(A) = 6 ;

∴ P(A) = $\frac{6}{36}$

B = event of "second die shows 4"

n(B) = 6 ;

∴ P(A) = $\frac{6}{36}$

A ∩ B = event of first die showing 4 and second die showing 4

n(A ∩ B) = 1 ;

∴ P(A ∩ B) = $\frac{1}{36}$

∴ P (A ∪ B) = P (A) + P (B) - P (A ∩ B) = $\frac{6}{36}+\frac{6}{36}-\frac{1}{36} = \frac{11}{36}$

Question-15

The probability of event A occurring is 0.5 and event B occurring is 0.3. If A and B are mutually exclusive events, then find the probability of neither A nor B occurring.

Solution:

P(A) = 0.5 ; P (B) = 0.3 ; A ∩ B = φ (given)

$P(\bar{A} \cap \bar{B})$ = 1- P(A∪ B)

= 1-{P(A)+P(B)}

= 1- {0.5 + 0.3} = 0.2

Question-16

A card is drawn at random from a deck of 52 cards. What is the probability that the drawn card is
(i) a queen or club card?
(ii) a queen or a black card?

Solution:

(i) $n(S) = 52$

A = getting a queen

$n(A) = 4$; $P(A) = \frac{4}{52}$

B = getting a club

$n(B) = 13$; $P(B) = \frac{13}{52}$

$A \cap B$ = getting a club queen

$n(A \cap B) = 1$; $P(A \cap B) = \frac{1}{52}$

$\therefore P(A \cup B) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$

(ii) A = getting a queen

$n(A) = 4$; $P(A) = \frac{4}{52}$

B = getting a black card;

$n(B) = 26$; $P(B) = \frac{26}{52}$

$A \cap B$ = getting a black queen

$n(A \cap B) = 2$; $P(A \cap B) = \frac{2}{52}$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$

Question-17

The probability that a new ship will get an award for its design is 0.25, the probability that it will get an award for the efficient use of materials is 0.35 and that it will get both awards is 0.15. What is the probability, that
(i) it will get atleast one of the two awards?
(ii) it will get only one of the awards?

Solution:

(i) Probability for design award = 0.25 = P (A)
Probability for efficient award = 0.35 = P(B)
Probability for both the awards = 0.15 = $P(A \cap B)$
Probability that it will get atleast one award
$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.25 + 0.35 - 0.15 = 0.45$
(ii) $P(A \cap \bar{B}) + P(\bar{A} \cap B) = P(A) - P(A \cap B) + P(B) - P(A \cap B)$
$= 0.25 - 0.15 + 0.35 - 0.15$
$= 0.60 - 0.30$
$= 0.30$

Question-18

Define independent and mutually exclusive events. Can two events be mutually exclusive and independent simultaneously?

Solution:

Independent events
Two events A and B are said to be independent events if happening of one does not depend on happening of the other.

Mutually exclusive events
Two events A and B are said to be mutually exclusive if happening one prevents the happening of the other.
These two events cannot be mutually exclusive and independent simultaneously for non-empty events. Of course possible for any one being null event that is impossible event

Question-19

If A and B are independents, prove that $\bar{A}$ and $\bar{B}$ are independents.

Solution:

Given A and B are independents.

$P(A \cap B) = P(A) . P(B)$

To prove that $\bar{A}$ and $\bar{B}$ and also independents.

That is $P(\bar{A} \cap \bar{B}) = P(\bar{A}).P(\bar{B})$

LHS $P(\bar{A} \cap \bar{B}) = 1 - P(\bar{A} \cup \bar{B})$

$= 1 - P(A) + P(B) - P(A \cap B)$

$= 1 - P(A) + P(B) - P(A). P(B)$

$=[1 - P(A)] [1 - P(B)]$

$= P(\bar{A}).P(\bar{B})$ = R.H.S

Question-20

If P(A) = 0.4, P(B) = 0.7 and P(B/A) = 0.5 find P(A/B) and P(A ∪ B).

Solution:

$P(A) = 0.4$, $P(B) = 0.4$ and $P(B/A) = 0.5$

$P(B/A) = \frac{P(A \cap B)}{P(A)}$

$0.5 = \frac{P(A \cap B)}{0.4}$

$P(A \cap B) = 0.2$

(i) $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{0.2}{0.7} = \frac{2}{7}$

(ii) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = \frac{4}{10} + \frac{2}{10} - \frac{2}{10} = \frac{9}{10}$

CBSE Class 11 Mathematics

Important Questions

Chapter 16

Probability

1 Marks Questions

1. Three coins are tossed simultaneously list the sample space for the event.

Ans. S = [HHH, HHT, HTH, THH, HTT, TTH, THT, TTT]

2. Two dice are thrown simultaneously. Find the prob. of getting doublet.

Ans. $n=(s)=36$ [S be the sample space]

let E be the event of getting doublet

$$P(E)=\frac{6}{36}\left[\because E=((1,1),(2,2),(3,3),(4,4),(5,5),(6,6))\right]$$

$$=\frac{1}{6}$$

3. 20 cards are numbered from 1 to 20. One card is then drawn at random. What is the prob. of a prime no.

Ans. Let S be the sample space and E be the event of prime no.

$$n(s)=\{1,2,3,.....20\}$$
$$n(E)=\{2,3,5,7,11,13,17,19\}$$
$$P(E)=\frac{n(E)}{n(S)}=\frac{8}{20}=\frac{2}{5}$$

4. If $\frac{3}{10}$ is the prob. that an event will happen, what is the prob. that it will not happen?

Ans. Let E be the event

$$P(E) = \frac{3}{10}$$

$$P(E) = 1 - P(E)$$

$$= 1 - \frac{3}{10}$$

$$= \frac{7}{10}$$

5. If A and B are two mutually exclusive events such that

P (A) $= \frac{1}{2}$ **and**

P (B) $= \frac{1}{3}$ **find P (A or B)**

Ans. $P(A \text{ or } B) = P(A) + P(B) - p(A \cap B)$

$$= \frac{1}{2} + \frac{1}{3} - \phi \ \left[P(A \cap B) = \phi\right]$$

$$= \frac{5}{6}$$

6. If E and F are events such that P(E) $= \frac{1}{4}$, **P(F)** $= \frac{1}{2}$ **and P(E and F)** $= \frac{1}{8}$ **find P(not E and not F)**

Ans.

$$P(E' \cap F') = P(E \cup F)'$$

$$=1-P(E\cup F)\left[\because P(E\cup F)=\frac{1}{4}+\frac{1}{2}-\frac{1}{8}=\frac{5}{8}\right]$$

$$=1-\frac{5}{8}$$

$$=\frac{3}{8}$$

7. A letter is chosen at random from the word 'ASSASSINATION'. Find the prob. that letter is a consonant.

Ans. P (consonant) $=\frac{7}{13}$

8. There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that at it is a woman?

Ans. P (a woman member is selected) $=\frac{6}{10}=\frac{3}{5}$

9. 4 cards are drawn from a well snuffled deck of 52 cards what is the prob. of obtaining 3 diamonds and one spade.

Ans.

$$\frac{{}^{13}C_3\times{}^{13}C_1}{{}^{52}C_4}=\frac{286}{20825}\left[\begin{array}{l}\because\ 3\text{ Spades out of }13\\ \text{and one ace out of }13\end{array}\right]$$

10. Describe the sample space. A coin is tossed and a die is thrown.

Ans. {H1,H2,H3,H4,H5,H6,T1,T2,T3,T4,T5,T6}

11. We wish to choose one child of 2 boys and 3 girls. A coin is tossed. If it comes up heads, a boy is chosen, otherwise a girl is chosen. Describe the sample space.

Ans. $\{HB_1, HB_2, TG_1, TG_2, TG_3\}$

12. What is the chance that a leap year, selected at random, will contain 53 Sundays?

Ans. A leap year consists of 366 days and therefore 52 complete weeks and two days over. These two days may be (Sunday, Monday), (Monday, Tuesday),(Tuesday, Wednesday), (Wednesday, Thursday), (Thursday, Friday), (Friday, Saturday), or (Saturday, Sunday)

P (a leap year has 53 Sunday) = $\frac{2}{7}$

13. If P (A) = 0.6, P(B) =0.4 and P (A $\cap$ B) = 0, then the events are?

Ans. Exclusive and exhaustive

14. In general the prob. of an event lie between?

Ans. 0 and 1.

15. A and B are two mutually exclusive events of an experiment. If P (not A) = 0.65, P (A $\cup$ B) = 0.65 and P (B) = K, find K

Ans. $P(A \cup B) = P(A) + P(B)$

$$P(A \cup B) = 1 - P(notA) + P(B)$$
$$0.65 = 1 - 0.65 + K$$
$$K = 0.30$$

16. A box contains 1 white and 3 identical black balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

Ans. S = {WB, BW, BB}

17. Three coins are tossed once. Find the probability at most two heads.

Ans. S = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

E = HHT, THH, HTH, HTT, THT, TTH, TTT

P (E) $= \frac{7}{8}$

18. One card is drawn from a pack of 52 cards, find the probability that drawn card is either red or king.

Ans.

$$p = \frac{26+2}{52}$$

$$= \frac{28}{52}$$

$$= \frac{7}{13}$$

19. Five cards are drawn from a well shuffled pack of 52 cards. Find the probability that all the five cards are hearts.

Ans. $\frac{{}^{13}C_5}{{}^{52}C_5} = \frac{33}{66640}$

20. From a deck of 52 cards four cards are accidently dropped. Find the chance that the missing cards should be one from each type.

Ans.

$$\frac{{}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1}{{}^{52}C_4} = \frac{2197}{20825}$$

21. In a random sampling three items are selected from a lot. Each item is tested and

classified as defective (D) or non – defective (H). Write the sample space.

Ans. S ={DDD, DDN, DND, NDD, DNN, NDN, NND, NNN}

22. Let $S = \{W_1, W_2, W_3, W_4, W_5, W_6\}$ **be sample space. Is the probability to outcome valid.**

W_1	W_2	W_3	W_4	W_5	W_6
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Ans. Yes, $\left[\because \frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=1\right]$

23. The odds in favour of an event are 3:5, find the probability of occurrence of this event.

Ans. $P = \frac{3}{8}$

24. What is the probability that an ordinary year has 53 Sundays?

Ans. $\frac{1}{7}$

25. If odds against an event be 7:9, find the probability of non-occurrence of this event.

Ans. $1-\frac{9}{16}=\frac{16-9}{16}=\frac{7}{16}$

CBSE Class 12 Mathematics
Important Questions
Chapter 16
Probability

4 Marks Questions

1. A coin is tossed three times consider the following event A : No head appears, B : Exactly one head appears and C : At least two heads appears do they form a set of mutually exclusive and exhaustive events.

Ans. S = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

A = {TTT}, B = {HTT, THT, TTH}, C = {HHT, HTH, THH, HHH}

$A \cup B \cup C = S$

Therefore A, B and C are exhaustive events.

Also $A \cap B = \phi, A \cap C = \phi, C \cap C = \phi,$ disjoint i.e. they are mutually exclusive.

2. A and B are events such that P (A) = 0.42, P (B) = 0.48, and P (A and B) = 0.16 determine (i) P (not A) (ii) P (not B) (iii) P (A or B)

Ans. $P(notA) = 1 - p(A) = 1 - 0.42 = 0.58$

$P(notB) = 1 - p(B) = 1 - 0.48 = 0.52$

$P(A \; or \; B) = P(A) + P(B) - P(A \cap B)$

$= 0.42 + 0.48 - 0.16$
$= 0.74$

3. Find the prob. that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all king (ii) 3 kings (iii) at least 3 kings

Ans. P (all king) $= \dfrac{{}^4C_4 \times {}^{48}C_3}{{}^{52}C_7} = \dfrac{1}{7735}$

P (3 king) $= \dfrac{{}^4C_3 \times {}^{48}C_4}{{}^{52}C_7} = \dfrac{9}{1547}$

P (atleast 3 king) = p (3 king) + p (4 king)

$$= \frac{9}{1547} + \frac{1}{7735} = \frac{46}{7735}$$

4. From a group of 2 boys and 3 girls, two children are selected at random. Describes the sample space associated with

(i) E_1 **: both the selected children are boys**

(ii) E_2 **: at least one selected child is a boy**

(iii) E_3 **: one boy and one girl is selected**

(iv) E_4 **: both the selected children are girls**

Ans. $S = \{B_1B_2,\ B_1G_1,\ B_1G_2,\ B_1G_3,\ B_2G_1,\ B_2G_2,\ B_2G_3,\ G_1G_2,\ G_1G_3,\ G_2G_3\}$

$E_1 = \{B_1B_2\}$

$E_2 = \{B_1B_2,\ B_1G_1,\ B_1G_2,\ B_1G_3,\ B_2G_1,\ B_2G_2,\ B_2G_3\}$

$E_3 = \{B_1G_1,\ B_1G_2,\ B_1G_3,\ B_2G_1,\ B_2G_2,\ B_2G_3\}$

$E_4 = \{G_1G_2,\ G_1G_3,\ G_2G_3\}$

5. A book contains 100 pages. A page is chosen at random. What is the chance that the sum of the digit on the page is equal to9

Ans. $E = \{9, 18, 27, 36, 45, 54, 63, 72, 81, 90\}$

$S = 100$

$$P(E) = \frac{10}{100}$$

$$= \frac{1}{10}$$

6. A pack of 50 tickets numbered 1 to 50 is shuffled and the two tickets are drawn find the prob.

(i) Both the ticket drawn bear prime no.

(ii) Neither of the tickets drawn bear prime no.

Ans. Prime no. from 1 to 50 are

$2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47$

(i) Two ticket out of fifty can be drawn in $C(50, 2)$

$$\text{P(both ticket bearing prime no.)} = \frac{{}^{15}C_2}{{}^{50}C_2} = \frac{3}{35}$$

(ii) P (neither of the tickets bear prime no.)

$$= \frac{{}^{35}C_2}{{}^{50}C_2} = \frac{17}{35}$$

7. In a class XI of a school 40% of the students study mathematics and 30% study biology. 10% of the class study both mathematics and Biology. If a student is selected at random from the class, find the prob. that he will be studying mathematics or biology.

Ans.

$P(M) = \frac{40}{100}, P(B) = \frac{30}{100}$

$P(M \cap B) = \frac{10}{100}$

$P(M \cup B) = P(M) + P(B) - P(M \cap B)$

$= \frac{40}{100} + \frac{30}{100} - \frac{10}{100} = 0.6$

8. A hockey match is played from 3 pm to 5 pm. A man arrives late for the match what is the prob. that he misses the only goal of the match which is scored at the 20th minute of the match?

Ans. The man can arrive any time between 3 to 5 pm so that time = 2hr =120 minutes

He see goal of he arrives within first 20 minutes

P (he see the goal) $= \frac{20}{120} = \frac{1}{6}$

P (not see the goal) $= 1 - \frac{1}{6} = \frac{5}{6}$

9. In a single throw of two dice, find the prob. that neither a doublet nor a total of 10 will appear.

Ans. Let S be the sample space and E_1, E_2 are event of doublet, and event of getting a total of 10 respectively

$E_1 = \{(1,1)(2,2)(3,3)(4,4)(5,5)(6,6)\}$

$E_2 = \{(4,6)(5,5)(6,4)\}$

$n(S) = 36$

$$P(E_1)=\frac{6}{36}=\frac{1}{6}$$

$$P(E_2)=\frac{3}{36}=\frac{1}{12}$$

$$P(E_1\cap E_2)=1$$

$$P(E_1\cup E_2)=\frac{2}{9}$$

$$P\left(E_1'\cap E_2'\right)=P(E_1\cup E_2)'$$

$$=1-(E_1\cup E_2)$$

$$=1-\frac{2}{9}=\frac{7}{9}$$

10. The prob. that a person will get an electrification contract is $\frac{2}{5}$ and the prob. that he will not get a plumbing contract is $\frac{4}{7}$. If the prob. of getting at least one contract is $\frac{2}{3}$, what is the prob. that he will get both?

Ans. Let A = Event of getting an electrification contract

B = Event of getting a plumbing contract

$$P(A)=\frac{2}{5}; \quad P(notB)=\frac{4}{7}$$

$$P(B)=1-\frac{4}{7}=\frac{3}{7}$$

$$P(A\cup B)=\frac{2}{3}$$

Req. prop $=P(A\cup B)$

$= P(A) + P(B) - P(A \cap B)$

$= P(A) + P(B) - P(A \cap B)$

$= \frac{2}{5} + \frac{3}{7} - \frac{2}{3} = \frac{42 + 45 - 70}{105}$

$= \frac{17}{105}$

11. In a town of 6000 people 1200, are over 50 yr. old and 2000 are females. It is known that 30% of the females are over 50 yr. what is the prob. that a randomly chosen individual from the town is either female or over 50 yr.

Ans. A_1 : Event of person being a female

A_2 : Event of person being 50 yr. old

$n(A_1) = 2000,\quad n(A_2) = 1200$

$n(A_1 \cap A_2) = 30\% \text{ of } 2000 = \frac{30}{1\cancel{00}} \times 20\cancel{00}$

$= 600$

$n(A_1 \cup A_2) = n(A_1) + n(A_2) - n(A_1 \cap A_2)$

$2000 + 1200 - 600$

$= 2600$

$P(A_1 \cup A_2) = \frac{2600}{6000} = \frac{13}{30}$

12. In a class of 60 students 30 opted for NCC, 32 opted for NSS, 24 opted for both NCC and NSS. If one of these students is selected at random find the probability that

(i). The student opted for NCC or NSS

(ii). The student has opted neither NCC nor NSS.

(iii). The student has opted NSS but not NCC.

Ans. A student opted for NCC

B student opted for NSS

$P(A)=\frac{30}{60}=\frac{1}{2}, \; P(B)=\frac{32}{60}=\frac{8}{15}$

$P(A\cap B)=\frac{24}{60}=\frac{2}{5}$

(i) $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=\frac{1}{2}+\frac{8}{15}-\frac{2}{5}$

$=\frac{19}{30}$

(ii) $P(A'\cap B')=P(A\cup B)'$

$=1-P(A\cup B)$

$=1-\frac{19}{30}$

$=\frac{11}{30}$

(iii) $P(B-A)=P(B)-P(A\cap B)$

$=\frac{8}{15}-\frac{2}{5}=\frac{2}{15}$

13. Two students Anil and Ashima appeared in an examination. The probability That Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. the probability that both will qualify the examination is 0.02 find the probability that

(a). Both Anil and Ashima will qualify the examination

(b). At least one of them will not qualify the examination and

(c). Only one of them will qualify the examination.

Ans. Let E and F denote the event that Anil and Ashima will qualify the examination respectively P (E) = 0.05, P (F) = 0.10, P ($E \cap F$) = 0.02

(a) $P(E' \cap F') = P(E \cup F)'$

$= 1 - P(E \cup F)$

$= 1 - [P(E) + P(F) - P(E \cap F)]$

$= 1 - 0.13 = 0.87$

(b) (at least one of them will not quality) = 1-P(both of them will quality)

=1-0.02

= 0.98

(c) P (only one of them will quality) = $P(E \cap F') + P(E' \cap F)$

$= P(E) - P(E \cap F) + P(F) - P(E \cap F)$

$= 0.05 - 0.02 + 0.10 - 0.02$

$= 0.11$

14. Out of 100 students, two sections of 40 and 60 are formed. If you and your friend are among the 100 students what is the probability that

(a) You both enter the same section?

(b) You both enter the different section?

Ans. Two sections of 40 and 60 can be formed out of 100 in ${}^{100}C_{60}$ or ${}^{100}C_{40}$ ways

(a) P (both enter the same section)

$$= \frac{{}^{40}C_2}{{}^{100}C_2} + \frac{{}^{60}C_2}{{}^{100}C_2} = \frac{17}{33}$$

(b) req. probability

$$= \frac{{}^{40}C_1 \times {}^{60}C_1}{{}^{100}C_2} = \frac{16}{33}$$

15. There are three mutually exclusive and exhaustive events $E_1, E_2,$ and E_3 . The odds are 8 : 3 against E_1 and 2 : 5 in favors of E_2 find the odd against E_3 .

Ans. Odds against E_1 are 8:3

So odds in favors of E_1 are 3:8

$$\therefore P(E_1) = \frac{3}{3+8} = \frac{3}{11}, \quad P(E_2) = \frac{2}{2+5} = \frac{2}{7}$$

$$P(E_1) + P(E_2) + P(E_3) = 1 \left[\begin{array}{l} E_1, E_2, \text{ and } E_3 \text{ are mutually} \\ \text{exclusive and exnaustive} \end{array}\right]$$

$$= 1 - \frac{3}{11} - \frac{2}{7}$$

$$= \frac{34}{77}$$

Odds against E_3 are

$$= \frac{1 - P(E_3)}{P(E_3)}$$

$$= \frac{1 - \frac{34}{77}}{77} = \frac{43}{34}$$

16. If an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing at least one of them is 0.95. What is the probability of passing both?

Ans. A : student passes first examination

B : student passes Second examination

P (A) = 0.8, P (B) = 0.7

P ($A \cup B$) = 0.95

P ($A \cap B$) =?

P ($A \cup B$) = P (A) + P (B) - P ($A \cap B$)

0.95 = 0.8 + 0.7 - P ($A \cap B$)

0.55 = P ($A \cap B$).

17. One card is drawn from a well shuffled deck of 52 cards. If each out come is equally likely calculate the probability that the card will be.

(i) a diamond (ii) Not an ace (iii) A black card (iv) Not a diamond.

Ans. (i) req. probability

$$= \frac{13}{52} = \frac{1}{4}$$

(ii)req. probability

$$=1-\frac{4}{52}=1-\frac{1}{13}=\frac{12}{13}$$

(iii) req. probability

$$=\frac{26}{52}=\frac{1}{2}$$

(iv)req. probability

$$=1-\frac{1}{4}=\frac{3}{4}$$

18. In a lottery, a person chooses six different natural no. at random from 1 to 20 and if these six no. match with six no. already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game?

Ans. Out of 20, a person can choose 6 natural no. In ${}^{20}C_6$ ways out of these there is only one choice which will match the six no. already by the committee

P (The person wins the prize)

$$=\frac{1}{{}^{20}C_6}=\frac{1}{38760}$$

19. From the employees of a company, 5 persons are elected to represent them in the managing committee of the company.

S.No.	Person	Age
1	**Male**	**30**
2	**Male**	**33**
3	**Female**	**46**
4	**Female**	**28**
5	**Male**	**41**

A person is selected at random from this group as a spoke person what is the probability the a spoke person will be either male or over 35 yr.

Ans. A: spoke person is a male

B: spoke person is over 35 yr.

$$P(A)=\frac{3}{5}$$

$$P(B)=\frac{2}{5}$$

$$P(A\cap B)=\frac{1}{5}$$

$$P(A\cup B)=P(A)+P(B)-P(A\cap B)$$

$$=\frac{3}{5}+\frac{2}{5}-\frac{1}{5}=\frac{4}{5}$$

20.A die has two faces each with no. 1 three faces each with no. 2 and one face with no. 3 if the die is rolled once, determine

(i) P (2) (ii) P (1 or 3) (iii) P(not 3)

Ans. A: getting a face with no. 1

B: getting a face with no. 2

C: getting a face with no. 3

$$P(A)=\frac{2}{6}=\frac{1}{3}$$

$$P(B)=\frac{3}{6}=\frac{1}{2}$$

$P(C) = \frac{1}{6}$

(i) $P(2) = \frac{1}{3}$

(ii) $P(1\ or\ 3) = P(1) + P(3)$

$= \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$

(iii) $P(not3) = 1 - \frac{1}{6} = \frac{5}{6}$

21. Find the probability that in a random arrangement of the letters of the word UNIVERSITY the two I's come together.

Ans. Total no. of words which can be formed by the letters of the word UNIVERSITY is $\frac{10!}{2!}$

regarding 2I'S as one letter no. of ways of arrangement in which both I'S are together = 9!

Req. probability

$$= \frac{9!}{\frac{10!}{2!}} = \frac{1}{5}$$

22. A bag contains 50 tickets no. 1,2,3,……,50 of which five are drawn at random and arranges in ascending order of magnitude $(x_1 < x_2 < x_3 < x_4 < x_5)$ find the probability that x_3 = 30

Ans. Five tickets out of 50 can be drawn in ${}^{50}C_5$ ways

Since $x_1 < x_2 < x_3 < x_4 < x_5$

And x_3 = 30

$x_1 < x_2 < 30$

i.e x_1 and x_2 should come from tickets no to 1 to 29 and this may happen in ${}^{29}C_2$ ways.

Remaining two i.e. $x_4, x_5 > 30$ should Come from 20 tickets no. from 31 to 50 in ${}^{20}C_2$ ways

Favorable case = ${}^{29}C_2 \times {}^{20}C_2$

Req. probability $= \frac{{}^{29}C_2 \times {}^{20}C_2}{{}^{50}C_5}$

$= \frac{551}{15134}$

CBSE Class 12 Mathematics
Important Questions
Chapter 16
Probability

6 Marks Questions

1.Three letters are dictated to three persons and an envelope is addressed to each of them, those letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the prob. that at least one letter is in its proper envelope.

Ans. Let the tree letters be denoted by A_1 A_2 and A_3 and three envelopes by E_1 E_2 and E_3 .

Total No. of ways to putting the letter into three envelopes is $3P_3$ = 6

No. of ways in which none of the letters is put into proper envelope = 2

Req. prob.

P (at least one letters is put into proper envelope) =1- P (none letters is put into proper envelopes)

$$=1-\frac{2}{6}$$
$$=\frac{2}{3}$$

2.If 4 digit no. greater than 5,000 are randomly formed the digits 0,1,3,5 and 7 what is the prob. of forming a no. divisible by 5 when

(i). The digits are repeated (ii) The repetition of digits is not allowed.

Ans. (i)

Thousand	**H**	**T**	**U**

5,7			

For a digit greatest then 5000 Thousand Place filled in 2 ways and remaining three place be filled in 5 ways

No. 40. can be formed = $2\times5\times5\times5=250$

ATQ

Thousand	**H**	**T**	**U**
5,7			0,5

If no. is divisible by 5

Unit place filled in 2 ways and thousand place also by 2 ways (5, 7)

No. formed $=2\times5\times5\times2=100$

Req. prob. $=\frac{100}{250}=\frac{2}{5}$

(ii) Digit not repeated

Thousand	**H**	**T**	**U**
5,7			

Thousand place filled in 2 ways

4 digit no. greater than 5 thousand $=2\times4\times3\times2=48$

Thousand	**H**	**T**	**U**
5			0
7			5,0

Favorable case $=1\times3\times2\times2 \quad + \quad 1\times3\times2\times1$

7 at thousand place 5 at thousand places

$=12+6$

$=18$

Req. prob. $=\frac{18}{48}=\frac{3}{8}$

3.20 cards are numbered from 1 to 20. One card is drawn at random what is the prob. that the no. on the card drawn is

(i) A prime no. (ii) An odd no. (iii) A multiple of 5 (iv) Not divisible by 3.

Ans. Let S be the sample space

S={1,2,3,4,5,…………20}

Let E_1, E_2 and E_3, E_4 are the event of getting prime no., an odd no, multiple of 5 and not divisible by 3 respectively

$$P(E_1)=\frac{8}{20}=\frac{2}{5},\ E_1=\{2,3,5,7,11,13,17,19\}$$

$$P(E_2)=\frac{10}{20}=\frac{1}{2},\ E_2=\{1,3,5,7,9,11,13,15,17,19\}$$

$$P(E_3)=\frac{4}{20}=\frac{1}{5},\ E_3=\{5,10,15,20\}$$

$$P(E_4)=\frac{14}{20}=\frac{7}{10},\ E_4=\{1,2,4,5,7,8,10,11,13,14,16,17,19,20\}$$

4.In a single throw of three dice, find the prob. of getting

(i) A total of 5 (ii) A total of at most 5.

Ans. Let S be the sample space E_1 be the event of total of 5.

(i) $E_1=\{(1,1,3),(1,3,1),(3,1,1),(1,2,2),(2,1,2),(2,2,1)\}$

$$S=6\times6\times6=216$$

$$P(E_1) = \frac{n(E_1)}{n(S)} = \frac{6}{216} = \frac{1}{26}$$

(ii)

$$E_2 = \{(1,1,1),(1,1,2),(1,2,1),(2,1,1),(1,1,3),(1,3,1),(3,1,1),(1,2,2),(2,1,2),(2,2,1)\}$$

$$P(E_2) = \frac{10}{216} = \frac{5}{108}$$

Probability

1. If the letters of the word **ALGORITHM** are arranged at random in a row what is the probability the letters GOR must remain together as a unit?

2. Six new employees, two of whom are married to each other, are to be assigned six desks that are lined up in a row. If the assignment of employees to desks is made randomly, what is the probability that the married couple will have nonadjacent desks?

   [**Hint**: First find the probability that the couple has adjacent desks, and then subtract it from 1.]

3. Suppose an integer from 1 through 1000 is chosen at random, find the probability that the integer is a multiple of 2 or a multiple of 9.

4. An experiment consists of rolling a die until a 2 appears.

   (i) How many elements of the sample space correspond to the event that the 2 appears on the k^{th} roll of the die?

   (ii) How many elements of the sample space correspond to the event that the 2 appears not later than the k^{th} roll of the die?

   [**Hint**:(a) First $(k-1)$ rolls have 5 outcomes each and k^{th} rolls should result in 1 outcomes. (b)$1 + 5 + 5^2 + ... + 5^{k-1}$]

5. A die is loaded in such a way that each odd number is twice as likely to occur as each even number. Find P(G), where G is the event that a number greater than 3 occurs on a single roll of the die.

6. In a large metropolitan area, the probabilities are .87, .36, .30 that a family (randomly chosen for a sample survey) owns a colour television set, a black and white television set, or both kinds of sets. What is the probability that a family owns either anyone or both kinds of sets?

7. If A and B are mutually exclusive events, $P(A) = 0.35$ and $P(B) = 0.45$, find

   (a) $P(A')$ (b) $P(B')$ (c) $P(A \cup B)$ (d) $P(A \cap B)$

   (e) $P(A \cap B')$ (f) $P(A' \cap B')$

8. A team of medical students doing their internship have to assist during surgeries at a city hospital. The probabilities of surgeries rated as very complex, complex, routine, simple or very simple are respectively, 0.15, 0.20, 0.31, 0.26, .08. Find the probabilities that a particular surgery will be rated

   (a) complex or very complex;

   (b) neither very complex nor very simple;

   (c) routine or complex

   (d) routine or simple

9. Four candidates A, B, C, D have applied for the assignment to coach a school cricket team. If A is twice as likely to be selected as B, and B and C are given about the same chance of being selected, while C is twice as likely to be selected as D, what are the probabilities that

(a) C will be selected?

(b) A will not be selected?

10. One of the four persons John, Rita, Aslam or Gurpreet will be promoted next month. Consequently the sample space consists of four elementary outcomes

S = {John promoted, Rita promoted, Aslam promoted, Gurpreet promoted}

You are told that the chances of John's promotion is same as that of Gurpreet, Rita's chances of promotion are twice as likely as Johns. Aslam's chances are four times that of John.

(a) Determine P (John promoted)

P (Rita promoted)

P (Aslam promoted)

P (Gurpreet promoted)

(b) If A = {John promoted or Gurpreet promoted}, find P (A).

11. The accompanying Venn diagram shows three events, A, B, and C, and also the probabilities of the various intersections (for instance, $P(A \cap B) = .07$). Determine

(a) $P(A)$

(b) $P(B \cap \bar{C})$

(c) $P(A \cup B)$

(d) $P(A \cap \bar{B})$

(e) $P(B \cap C)$

(f) Probability of exactly one of the three occurs.

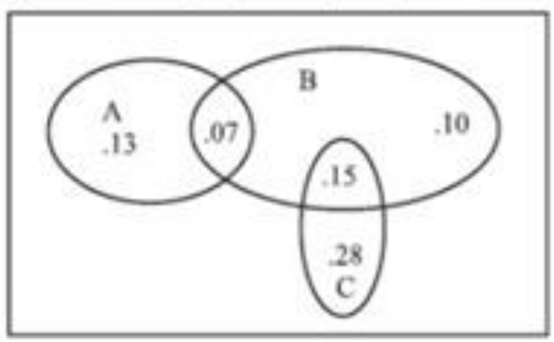

Fig. 16.2

12. One urn contains two black balls (labelled B1 and B2) and one white ball. A second urn contains one black ball and two white balls (labelled W1 and W2).

Suppose the following experiment is performed. One of the two urns is chosen at random. Next a ball is randomly chosen from the urn. Then a second ball is chosen at random from the same urn without replacing the first ball.

(a) Write the sample space showing all possible outcomes

(b) What is the probability that two black balls are chosen?

(c) What is the probability that two balls of opposite colour are chosen?

13. A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the Probability that

(a) All the three balls are white

(b) All the three balls are red

(c) One ball is red and two balls are white

14. If the letters of the word ASSASSINATION are arranged at random. Find the Probability that

(a) Four S's come consecutively in the word

(b) Two I's and two N's come together

(c) All A's are not coming together

(d) No two A's are coming together.

15. A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card.

16. A sample space consists of 9 elementary outcomes $e_1, e_2, ..., e_9$ whose probabilities are

$P(e_1) = P(e_2) = .08,\ P(e_3) = P(e_4) = P(e_5) = .1$

$P(e_6) = P(e_7) = .2,\ P(e_8) = P(e_9) = .07$

Suppose $A = \{e_1, e_5, e_8\}$, $B = \{e_2, e_5, e_8, e_9\}$

(a) Calculate P (A), P (B), and $P(A \cap B)$

(b) Using the addition law of probability, calculate $P(A \cup B)$

(c) List the composition of the event $A \cup B$, and calculate $P(A \cup B)$ by adding the probabilities of the elementary outcomes.

(d) Calculate $P(\bar{B})$ from P (B), also calculate $P(\bar{B})$ directly from the elementary outcomes of $\bar{B}$

17. Determine the probability p, for each of the following events.

(a) An odd number appears in a single toss of a fair die.

(b) At least one head appears in two tosses of a fair coin.

(c) A king, 9 of hearts, or 3 of spades appears in drawing a single card from a well shuffled ordinary deck of 52 cards.

(d) The sum of 6 appears in a single toss of a pair of fair dice.

Objective Type Questions

18. In a non-leap year, the probability of having 53 tuesdays or 53 wednesdays is

(A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{3}{7}$ (D) none of these

19. Three numbers are chosen from 1 to 20. Find the probability that they are not consecutive

(A) $\frac{186}{190}$ (B) $\frac{187}{190}$ (C) $\frac{188}{190}$ (D) $\frac{18}{{}^{20}C_3}$

20. While shuffling a pack of 52 playing cards, 2 are accidentally dropped. Find the probability that the missing cards to be of different colours

(A) $\frac{29}{52}$ (B) $\frac{1}{2}$ (C) $\frac{26}{51}$ (D) $\frac{27}{51}$

21. Seven persons are to be seated in a row. The probability that two particular persons sit next to each other is

(A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C) $\frac{2}{7}$ (D) $\frac{1}{2}$

22. Without repetition of the numbers, four digit numbers are formed with the numbers 0, 2, 3, 5. The probability of such a number divisible by 5 is

(A) $\frac{1}{5}$ (B) $\frac{4}{5}$ (C) $\frac{1}{30}$ (D) $\frac{5}{9}$

23. If A and B are mutually exclusive events, then

(A) $P(A) \leq P(\bar{B})$ (B) $P(A) \geq P(\bar{B})$

(C) $P(A) < P(\bar{B})$ (D) none of these

24. If $P(A \cup B) = P(A \cap B)$ for any two events A and B, then

(A) $P(A) = P(B)$ (B) $P(A) > P(B)$

(C) $P(A) < P(B)$ (D) none of these

25. 6 boys and 6 girls sit in a row at random. The probability that all the girls sit together is

(A) $\frac{1}{432}$ (B) $\frac{12}{431}$ (C) $\frac{1}{132}$ (D) none of these

26. A single letter is selected at random from the word 'PROBABILITY'. The probability that it is a vowel is

(A) $\frac{1}{3}$ (B) $\frac{4}{11}$ (C) $\frac{2}{11}$ (D) $\frac{3}{11}$

27. If the probabilities for A to fail in an examination is 0.2 and that for B is 0.3, then the probability that either A or B fails is

(A) $> .5$ (B) $.5$ (C) $\leq .5$ (D) 0

28. The probability that at least one of the events A and B occurs is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\bar{A}) + P(\bar{B})$ is

(A) 0.4 (B) 0.8 (C) 1.2 (D) 1.6

29. If M and N are any two events, the probability that at least one of them occurs is

(A) $P(M) + P(N) - 2P(M \cap N)$ (B) $P(M) + P(N) - P(M \cap N)$

(C) $P(M) + P(N) + P(M \cap N)$ (D) $P(M) + P(N) + 2P(M \cap N)$

True or False Type Questions

30. The probability that a person visiting a zoo will see the giraffee is 0.72, the probability that he will see the bears is 0.84 and the probability that he will see both is 0.52.

31. The probability that a student will pass his examination is 0.73, the probability of the student getting a compartment is 0.13, and the probability that the student will either pass or get compartment is 0.96.

32. The probabilities that a typist will make 0, 1, 2, 3, 4, 5 or more mistakes in typing a report are, respectively, 0.12, 0.25, 0.36, 0.14, 0.08, 0.11.

33. If A and B are two candidates seeking admission in an engineering College. The probability that A is selected is .5 and the probability that both A and B are selected is at most .3. Is it possible that the probability of B getting selected is 0.7?

34. The probability of intersection of two events A and B is always less than or equal to those favourable to the event A.

35. The probability of an occurrence of event A is .7 and that of the occurrence of event B is .3 and the probability of occurrence of both is .4.

36. The sum of probabilities of two students getting distinction in their final examinations is 1.2.